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OCT 29 2015
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Date: OCT 29 2015
Refer To: ADESH-15-157
LAUR: 15-28017
Locates Action No.: N/A

John Kieling, Bureau Chief
Hazardous Waste Bureau
New Mexico Environment Department
2905 Rodeo Park Drive East, Building 1
Santa Fe, NM 87505-6303

Subject: Submittal of the Semiannual Progress Report for Corrective Measures Evaluation/Corrective Measures Implementation for Consolidated Unit 16-021(c)-99

Dear Mr. Kieling:

Enclosed please find two hard copies with electronic files of the Semiannual Progress Report for Corrective Measures Evaluation/Corrective Measures Implementation for Consolidated Unit 16-021(c)-99. This deliverable meets the requirement in the New Mexico Environment Department's (NMED's) letter dated November 7, 2011, to provide semiannual progress reports.

Based on Los Alamos National Laboratory's (the Laboratory's) discussions with the NMED Hazardous Waste Bureau (HWB) on April 15, 2015, and on July 7, 2015, reporting of project status in this format is no longer necessary. The U.S. Department of Energy (DOE) and Los Alamos National Security, LLC (LANS) therefore request approval from NMED to discontinue submitting semiannual progress reports for the corrective measures evaluation/corrective measures implementation (CMI) for Consolidated Unit 16-021(c)-99. Instead, as discussed with NMED, the updates will be incorporated into a report that will tie in with closeout and monitoring activities associated with the surface CMI, as described below.

The Laboratory requests approval to close out the surface CMI by performing the following activities, as discussed during the July 7, 2015, technical meeting with NMED-HWB: (1) remove the permeable reactive barrier located in Cañon de Valle; (2) evaluate the adequacy of the existing alluvial groundwater monitoring network and install additional alluvial wells, if necessary, to monitor the downgradient concentrations of RDX (hexahydro-1,3,5-trinitro-1,3,5-triazine) from spring discharges; and (3) evaluate and propose actions for SWSC, Burning Ground, and Martin Springs. The specific recommendation for the surface CMI proposed by DOE/LANS will include an approach and schedule for reporting.

If you have any questions, please contact Stephani Swickley at (505) 606-1628 (sfuller@lanl.gov) or Cheryl Rodriguez at (505) 665-5330 (cheryl.rodriguez@em.doe.gov).

Sincerely,

Bruce Robinson, Program Director
Environmental Remediation Program
Los Alamos National Laboratory

Sincerely,

Douglas E. Hintze, Manager
Environmental Management
Los Alamos Field Office

BR/DE/SS:sm

Enclosure: Two hard copies with electronic files – Semiannual Progress Report for Corrective Measures Evaluation/Corrective Measures Implementation for Consolidated Unit 16-021(c)-99 (EP2015-0182)

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LA-UR-15-28017
October 2015
EP2015-0182

Semiannual Progress Report for Corrective Measures Evaluation/Corrective Measures Implementation for Consolidated Unit 16-021(c)-99

Prepared by the Environmental Programs Directorate

EP2015-0182

Semiannual Progress Report for Corrective Measures Evaluation/ Corrective Measures Implementation for Consolidated Unit 16-021(c)-99

October 2015

Responsible project manager:

Printed Name	Signature	Title	Organization	Date
Stephani Swickley	Stephani Swickley	Project Manager	Environmental Remediation Program	10/22/15

Responsible LANS representative:

Printed Name	Signature	Title	Organization	Date
Randall Erickson	for	Acting Associate Director	Environmental Programs	10/22/15

Responsible DOE representative:

Printed Name	Signature	Title	Organization	Date
Douglas E. Hintze	Douglas E Hintze	Manager	DOE-EM-LA	29 OCT 2015

EXECUTIVE SUMMARY

Significant achievements accomplished during this reporting period include drilling regional aquifer well R-58; submitting the R-63i well completion report; conducting two rounds of quarterly groundwater sampling at Technical Area 16 260 monitoring group locations; submitting a work plan for a tracer test at Consolidated Unit 16-021(c)-99; submitting a work plan for aquifer testing of three wells in the intermediate groundwater system; and conducting additional studies of the geology, geochemistry, and the potential for natural attenuation and bioremediation to further refine the site conceptual model.

CONTENTS

Figure

1.0 INTRODUCTION

This report serves as the semiannual progress report for the corrective measures evaluation (CME)/ corrective measures implementation (CMI) for Consolidated Unit 16-021(c)-99. It summarizes activities Los Alamos National Laboratory (LANL or Laboratory) completed from April to September of fiscal year (FY) 2015 on the CME/CMI for Consolidated Unit 16-021(c)-99, the Technical Area 16 (TA-16) 260 Outfall.

2.0 SURFACE CMI

2.1 Best Management Practices

Inspection of best management practices (BMPs) associated with Consolidated Unit 16-021(c)-99 is completed under the Individual Storm Water Permit, pursuant to the requirements of National Pollutant Discharge Elimination System (NPDES) Permit No. NM0030759 (hereafter, the Individual Permit), as authorized by the U.S. Environmental Protection Agency (EPA). Current BMPs, called controls in the Individual Permit, include a low-permeability cap consisting of a 20-in.-thick crushed tuff/bentonite cap installed on top of the former settling pond, five earthen berms and one rock check dam installed to control run-on/runoff, riprap within the former channel to control runoff, and established vegetation to control erosion from the site. Controls are inspected annually and following a significant rain event of 0.25 in. or greater within 30 min, as measured at rain gage RG257, per the Individual Permit.

During the period from April 1, 2015, to September 30, 2015, the following significant rain events were recorded at rain gage RG257:

Date	30-min Maximum Intensity	24-h Total	BMP Inspection Date	BMP Maintenance
6/26/15	0.37	0.40	7/9/15	None required
7/6/15	0.41	1.21		
7/12/15	0.32	0.49	7/27/15	None required
7/20/15	0.72	1.58		
7/29/15	0.32	0.83	8/4/15	None required
7/31/15	0.59	0.95		
8/1/15	1.20	1.56		
8/2/15	0.25	0.70		
8/17/15	0.41	0.64	9/1/15	None required

Per the Individual Permit, if several storms exceeding the intensity threshold occur over a period not to exceed 15 d from the first event, a single inspection is sufficient to achieve compliance (hence the number of events differs from the number of inspections). Inspection results will be reported in the "Storm Water Individual Permit Annual Report, Reporting Period: January 1–December 31, 2015," submittal to the EPA Region 6 Enforcement Division as well as to the New Mexico Environment Department (NMED) Surface Water Quality Bureau (SWQB).

2.2 Hydrogeologic Investigations

Hydrogeologic investigations include periodic water sampling as outlined in the 1998 Resource Conservation and Recovery Act facility investigation report (LANL 1998, 059891) as well as continuing investigations delineated in the 1998 corrective measures study plan (LANL 1998, 062413). The current groundwater sampling program is conducted per the Laboratory's Interim Facility-Wide Groundwater Monitoring Plan (LANL 2014, 256728).

Groundwater sampling events were conducted in the Cañon de Valle watershed in May 2015 and in July 2015. Data from the sampling events will be included in upcoming periodic monitoring reports.

The May sampling event was conducted from May 7 to May 21, 2015. TA-16 260 monitoring group quarterly requirements were met during this event. Samples were collected from three monitoring wells completed in the perched-intermediate groundwater system and from one regional monitoring well.

The July sampling event was conducted from July 15 to July 29, 2015. The TA-16 260 monitoring group semiannual and quarterly requirements were met during this event. Five regional wells, eight perched-intermediate wells, three alluvial wells, two base-flow locations, and three springs were sampled. Alluvial monitoring wells WCO-1r and FLC-16-25280 were not sampled because of insufficient water, and SWSC Spring was dry. Additionally, screening samples were collected from Westbay well R-25 screens 4, 5, and 6 for analysis of RDX (hexahydro-1,3,5-trinitro-1,3,5-triazine).

2.3 CMI Activities – April 2015 to September 2015

The Cañon de Valle pilot permeable reactive barrier (PRB) remains nonoperational because of post–Las Conchas fire flooding, which destroyed the capture wall for the PRB. The current location of the PRB is not feasible for reinstalling the barrier because of the deep scouring of the alluvial sediment in that area.

The carbon-filtration treatment systems at Burning Ground, SWSC, and Martin Springs remain in place but are not operational because of NPDES permitting requirements. The Laboratory is still evaluating the regulatory path forward for treatment at Burning Ground, SWSC, and Martin Springs.

Samples for NPDES Form 2C parameters and for parameters from the New Mexico State Standards for Interstate and Intrastate Surface Waters were collected at Burning Ground Spring on June 18, 2015, and Martin Spring on July 16, 2015. The results will be evaluated for potential monitoring/treatment requirements under the NPDES Permit Program. SWSC Spring was dry on both of these sampling dates, therefore no samples were collected.

3.0 SUBSURFACE CME

3.1 CME for Deep Groundwater

Key activities accomplished during this reporting period include submittal of the Completion Report for Intermediate Aquifer Well R-63i (LANL 2015, 600934), submittal of the Work Plan for a Tracer Test at Consolidated Unit 16-021(c)-99, Technical Area 16, Revision 1 (LANL 2015, 600535), and submittal of the Work Plan for Intermediate Groundwater System Characterization at Consolidated Unit 16-021(c)-99 (LANL 2015, 600686). In addition, studies of the geology, geochemistry, and the potential for natural attenuation and bioremediation of contaminants at TA-16 have been initiated to further refine the site conceptual model.

Details of the activities completed during the period from April to September 2015 are summarized below.

3.1.1 Monitoring Well Installation

One new regional monitoring well, R-58, was drilled in the TA-16 area north of S-Site Canyon (Figure 3.1-1) to a total depth of 1378 ft below ground surface (bgs) (LANL 2012, 212117). A monitoring well design was submitted to and approved by the NMED Hazardous Waste Bureau (NMED-HWB). Data from R-58 will be used to monitor contaminants downgradient of potential contaminant breakthrough locations for S-Site and Fishladder Canyons. Regional groundwater was encountered at R-58 at a depth of 1240 ft bgs; water-level data from R-58 will constrain the shape of the regional water table and groundwater flow directions in this area. No perched groundwater was detected during the drilling of R-58.

Monitoring well R-63i was completed on November 10, 2014, at a location near regional well R-63 (Figure 3.1-1) (LANL 2013, 235924). The well is completed in deep perched-intermediate groundwater in a zone with very low yield. The completion report for R-63i was submitted to NMED on September 29, 2015 (LANL 2015, 600934).

3.1.2 Preparation for Tracer Deployment at TA-16

Significant progress was made to prepare for the tracer test at TA-16 during the period from April to September 2015 (LANL 2015, 600535).

- A laboratory study was conducted to evaluate the stability of naphthalene sulfonate (NF) tracers under TA-16 groundwater geochemical conditions and to examine potential interference of NF tracers with RDX analysis. The data showed that over a period of 6 mo, the tracers remained stable under all conditions and did not influence RDX concentrations.
- The Work Plan for a Tracer Test at Consolidated Unit 16-021(c)-99, Technical Area 16, Revision 1, was submitted to NMED on July 13, 2015 (LANL 2015, 600535) and approved by NMED on August 3, 2015 (NMED 2015, 600687). Notices of intent (NOIs) addressing the tracer tests were submitted to the NMED Ground Water Quality Bureau (GWQB) and SWQB on July 28, 2015, and August 6, 2015, respectively.
- The NMED-SWQB responded in a September 11, 2015, letter that neither approved nor disapproved the use of tracers but advised the Laboratory to contact EPA Region 6 to inquire whether a federal permit may be required (NMED 2015, 600928). A determination that no discharge permit is required for the groundwater tracer tests was received from the NMED-GWQB on September 22, 2015 (NMED 2015, 600924).
- While waiting for regulatory approval of the NOIs, preparation for deployment of the tracers continued. Shortly after NMED approval of the tracer test work plan on August 3, 2015 (NMED 2015, 600687), the tracers were ordered from a specialty chemical manufacturer and received in late September 2015. Field-readiness activities were conducted during August and September to prepare for tracer deployment.
- On September 18, 2015, the Laboratory submitted a letter to NMED requesting an extension from the September 30, 2015, date to deploy tracers at Consolidated Unit 16-021(c)-99 to a new date of December 18, 2015 (LANL 2015, 600918). The request was submitted because of delays in obtaining the tracers, to allow time for completing the dilution tests before tracer deployment, and to allow time for resolution of permitting requirements for the surface-water tracer.

3.1.3 Site Conceptual Model Refinement

A number of additional activities are being conducted to refine the site conceptual model. These are discussed below.

RDX Inventory Reevaluation

A revised estimate of the RDX inventory for TA-16 is being developed that incorporates recent analytical data, including data from new monitoring wells. The distributions of RDX in alluvial groundwater, in the vadose zone, in perched-intermediate groundwater, and in regional groundwater were first estimated in 2006 and were discussed in Appendix H of the Investigation Report for Intermediate and Regional Groundwater, Consolidated Unit 16-021(c)-99 (LANL 2006, 093798). Because of new sampling data acquired over the last few years, including data from recently drilled wells, the new inventory estimates show a substantial reduction in the groundwater inventory compared with the 2006 estimated inventory. The reduction in inventory arises from better definition of contaminant extent and from newer analytical data showing that RDX concentrations in the deeper groundwater zones are lower than assumed in 2006.

Geochemical Studies

A detailed geochemical evaluation of TA-16 groundwater data is being conducted based on historical data from alluvial, intermediate, and regional groundwater. Geochemical diagrams are being developed to examine broad trends in geochemical variability at TA-16, and multivariate statistical analyses are being conducted to examine detailed chemical characteristics of the various zones. The results will be used to further refine the site conceptual model for the area.

Geological Studies

Geologic studies to determine bedding orientations of lithologies that affect infiltration pathways through the vadose zone and control flow directions in perched groundwater were initiated during the period from April through September 2015. A field survey was conducted on the north and south sides of Cañon de Valle between well CdV-9-1(i) and well R-63 to check the rock types and the stratigraphic sequence to confirm the accuracy of published data for the area. Geophysical logs for 17 wells in the vicinity of TA-16 were reviewed to evaluate geologic contacts constraining the three-dimensional (3-D) geological framework for the TA-16 area. Revisions of geologic contacts based on geophysics were reviewed by examining drill cuttings, and the resulting data were provided to Weston, Inc., for inclusion in a larger effort to update the Laboratory's 3-D geologic model. The geophysical logs were also used to identify subunits of the Otowi Member of the Bandelier Tuff. Pumice fragments were collected from the well cuttings for chemical analyses to check the lateral distributions of the various units of the Bandelier Tuff and the Cerro Toledo interval. The results of the geologic investigations will be used to identify vadose zone infiltration pathways, potential perching horizons, permeable units within the subsurface, and structural features and faulting within the TA-16 area.

Natural Attenuation and Potential Bioremediation Studies

The activities and accomplishments carried out in the natural attenuation and potential bioremediation task include examining the rate and mechanisms of RDX degradation under abiotic conditions; initiating a study to characterize the microbial diversity in intermediate and regional aquifer groundwater samples; examining the ability of indigenous microbes to degrade RDX under stimulated conditions; and deploying passive samplers in regional aquifer wells R-47 and R-18, intermediate wells CdV-16-2(i)r and

CdV-16-1(i), and shallow alluvial wells FLC-16-25280 and CdV-16-611923 to collect samples for assessment of natural attenuation mechanisms for RDX.

4.0 REGULATORY, PUBLIC, AND STAKEHOLDER INVOLVEMENT

A meeting was held on July 7, 2015, with the NMED-HWB to discuss the path forward for closure of the 260 Outfall surface CMI. The approach for closure will likely involve additional actions, including removal of the PRB; evaluation of the alluvial monitoring network and installation of additional alluvial wells, if necessary; and evaluating the need to operate the spring treatment units at Burning Ground, SWSC, and Martin Springs.

A presentation about the RDX in groundwater was given to the Northern New Mexico Citizen's Advisory Board (NNMCAB) on July 8, 2015. The NNMCAB showed considerable interest in the studies being conducted for the RDX project at TA-16 and requested a tour of the TA-16 study area. On August 12, 2015, a tour of TA-16 and the RDX study area was given to the NNMCAB. During the tour, the RDX project was discussed in more depth, along with the upcoming plans for the TA-16 tracer test and aquifer testing of the intermediate groundwater system.

5.0 PROBLEMS ENCOUNTERED/ACTIONS TO RECTIFY PROBLEMS

The hydrologic system in Cañon de Valle was strongly impacted by the August 2011 and September 2013 floods because of severe damage to the watershed caused by the Las Conchas wildfire. Two long-term alluvial wells were destroyed in this flooding, and these wells may need to be replaced. The PRB capture wall was severely damaged and needs to be removed. Lastly, the spring treatment units at Burning Ground, SWSC, and Martin Springs have not been turned on because of permitting issues.

Deployment of the surface-water tracer at Cañon de Valle (in accordance with the requirements of the tracer test work plan [LANL 2015, 600686]) is awaiting approval by the EPA. In a letter to the Laboratory dated September 11, 2015, the NMED-SWQB neither approved nor disapproved the use of tracers in Cañon de Valle but advised the Laboratory to contact EPA Region 6 regarding federal permit requirements (NMED 2015, 600928). EPA Region 6 has been contacted, and the Laboratory is awaiting their decision regarding the permit requirements for the tracer deployment in Cañon de Valle.

6.0 WORK PLANNED FOR THE NEAR FUTURE

6.1 Surface CMI

6.1.1 BMPs

- Continue to inspect existing BMPs following significant precipitation events.

6.1.2 Hydrogeologic Investigations

- Check for the presence and levels of water in the Cañon de Valle alluvial system.
- Continue precipitation monitoring.

6.1.3 Surface CMI Activities

- Submit a letter to NMED outlining proposed actions for closure of the 260 surface CMI, and recommend discontinuation of the Consolidated Unit 16-021(c)-99 CME/CMI semiannual progress reports.
- Monitor the bentonite cap in the TA-16 260 Outfall pond.

6.2 Subsurface CME

- Complete installation of R-58 by the end of October 2015, and install a dedicated sampling system in the well by the end of December 2015.
- Complete deployment of the perched groundwater tracers in monitoring wells R-25b, CdV-16-9(i), and CdV-16-1(i) by December 18, 2015.
- Complete deployment of the surface-water tracer in Cañon de Valle after EPA Region 6 has provided direction regarding permit requirements for the surface-water tracer deployment.
- Conduct cross-hole aquifer testing at CdV-9-1(i), CdV-16-4ip, and CdV-16-1(i) to refine the conceptual model regarding spatial extent, hydraulic characteristics, and hydraulic connection between deep perched-intermediate groundwater occurrences potentially contaminated with RDX.
- Continue with ongoing activities to update the RDX conceptual site model, including continued in-depth analysis and review of available geologic data, geochemical data, and geohydrologic data.
- Continue the ongoing RDX degradation studies, including a review of monitoring data, to establish correlations between RDX and degradation products, and conduct RDX treatability studies to determine if enhanced bioremediation techniques can be used to degrade RDX under site-specific conditions at TA-16.
- Update and refine hydrogeologic models of the 3-D distribution of groundwater in the vadose zone and regional aquifer at the site. The analyses will evaluate groundwater mass balance accounting for groundwater volume within the vadose zone and regional aquifer, flow directions and magnitudes, and zones of groundwater recharge and discharge. Develop 3-D numerical model simulating groundwater flow and transport at the site, including within the unsaturated and saturated portions of the vadose zone and the regional aquifer. The model will be used to evaluate corrective action alternatives for groundwater contamination and to predict future contaminant concentrations in perched-intermediate and regional groundwater.

6.3 Public and Stakeholder Involvement

Meet with NMED personnel to discuss status of the perched groundwater tracer deployment activities and to discuss closing out the surface CMI activities.

7.0 RECOMMENDATIONS

Recommendations for the TA-16 260 Outfall subsurface CME and surface CMI include the following.

- Activities relevant to the groundwater CME should be given priority in light of recent observations in deep groundwater. These observations include persistent elevated RDX concentrations in well CdV-16-4ip (at ~150 µg/L) and increasing RDX concentrations in regional well R-18 (at ~2.3 µg/L) and in deep perched-intermediate well CdV-16-2(i)r. RDX concentrations in CdV-16-2(i)r have doubled during the 10 yr since well installation, increasing from ~50 µg/L to ~100 µg/L. Elevated RDX concentrations have also been detected in perched-intermediate groundwater north of Cañon de Valle; RDX concentrations in screening samples from CdV-9-1(i) range from ~250 µg/L to ~80 µg/L.
- Successful completion of these activities over the next 2 yr should provide the data needed to analyze the corrective action alternatives for groundwater contamination at TA-16.
- The Laboratory recommends regular meetings between the Laboratory project team and NMED technical staff to review the planned RDX project activities and to build consensus on the technical approach to complete the groundwater CME.
- Based on the Laboratory's discussions with NMED-HWB on April 15, 2015 and on July 7, 2015, providing semiannual progress reports is no longer necessary. The Laboratory therefore requests approval from NMED to discontinue submitting semiannual progress reports for the CME/CMI for Consolidated Unit 16-021(c)-99. Instead, as discussed with NMED, these updates will be incorporated into a report that will tie in to closeout and monitoring activities associated with the surface CMI as described below.
- The Laboratory requests approval to close out the surface CMI by performing the following activities, as discussed during the July 7, 2015, technical meeting with NMED-HWB: (1) remove the PRB located in Cañon de Valle; (2) evaluate adequacy of the existing alluvial groundwater monitoring network and install additional alluvial wells, if necessary, for monitoring the downgradient concentrations of RDX from spring discharges; and (3) evaluate and propose actions for SWSC, Burning Ground, and Martin Springs. The specific recommendations for the surface CMI will include an approach and schedule for reporting.

8.0 REFERENCES

The following list includes all documents cited in this report. Parenthetical information following each reference provides the author(s), publication date, and ER ID or ESH ID. This information is also included in text citations. ER IDs were assigned by the Environmental Programs Directorate's Records Processing Facility (IDs through 599999), and ESH IDs are assigned by the Environment, Safety, and Health (ESH) Directorate (IDs 600000 and above). IDs are used to locate documents in the Laboratory's Electronic Document Management System and, where applicable, in the master reference set.

Copies of the master reference set are maintained at the NMED Hazardous Waste Bureau and the ESH Directorate. The set was developed to ensure that the administrative authority has all material needed to review this document, and it is updated with every document submitted to the administrative authority. Documents previously submitted to the administrative authority are not included.

LANL (Los Alamos National Laboratory), September 1998. "RFI Report for Potential Release Site 16-021(c)," Los Alamos National Laboratory document LA-UR-98-4101, Los Alamos, New Mexico. (LANL 1998, 059891)

LANL (Los Alamos National Laboratory), September 1998. "CMS Plan for Potential Release Site 16-021(c)," Los Alamos National Laboratory document LA-UR-98-3918, Los Alamos, New Mexico. (LANL 1998, 062413)

LANL (Los Alamos National Laboratory), August 2006. "Investigation Report for Intermediate and Regional Groundwater, Consolidated Unit 16-021(c)-99," Los Alamos National Laboratory document LA-UR-06-5510, Los Alamos, New Mexico. (LANL 2006, 093798)

LANL (Los Alamos National Laboratory), December 2012. "Drilling Work Plan for Regional Aquifer Well R-58," Los Alamos National Laboratory document LA-UR-12-26784, Los Alamos, New Mexico. (LANL 2012, 212117)

LANL (Los Alamos National Laboratory), February 2013. "Drilling Work Plan for Well R-63i," Los Alamos National Laboratory document LA-UR-13-20150, Los Alamos, New Mexico. (LANL 2013, 235924)

LANL (Los Alamos National Laboratory), May 2014. "Interim Facility-Wide Groundwater Monitoring Plan for the 2015 Monitoring Year, October 2014–September 2015," Los Alamos National Laboratory document LA-UR-14-23327, Los Alamos, New Mexico. (LANL 2014, 256728)

LANL (Los Alamos National Laboratory), July 2015. "Work Plan for a Tracer Test at Consolidated Unit 16-021(c)-99, Technical Area 16, Revision 1," Los Alamos National Laboratory document LA-UR-15-24089, Los Alamos, New Mexico. (LANL 2015, 600535)

LANL (Los Alamos National Laboratory), August 2015. "Work Plan for Intermediate Groundwater System Characterization at Consolidated Unit 16-021(c)-99," Los Alamos National Laboratory document LA-UR-15-24545, Los Alamos, New Mexico. (LANL 2015, 600686)

LANL (Los Alamos National Laboratory), September 2015. "Completion Report for Intermediate Aquifer Well R-63i," Los Alamos National Laboratory document LA-UR-15-26729, Los Alamos, New Mexico. (LANL 2015, 600934)

LANL (Los Alamos National Laboratory), September 18, 2015. "Request for Extension to Deploy Tracers at Consolidated Unit 16-021(c)-99," Los Alamos National Laboratory letter (ADESH-15-139) to J. Kieling (NMED-HWB) from A.M. Dorries (LANL) and C. Gelles (DOE-EM-LA), Los Alamos, New Mexico. (LANL 2015, 600918)

NMED (New Mexico Environment Department), August 3, 2015. "Approval with Comment, Work Plan for a Tracer Test at Consolidated Unit 16-021(c)-99, Technical Area 16, Revision 1," New Mexico Environment Department letter to C. Gelles (DOE-NA-LA) and M.T. Brandt (LANL) from J.E. Kieling (NMED-HWB), Santa Fe, New Mexico. (NMED 2015, 600687)

NMED (New Mexico Environment Department), September 11, 2015. "SWQB Response to Notice of Intent to Discharge, Tracer Test, Los Alamos National Laboratory (LANL), Technical Area (TA) 16, Cañon de Valle near Burning Ground Spring," New Mexico Environment Department letter to G.E. Turner (DOE) and A. Dorries (LANL) from J. Hogan (NMED-SWQB), Santa Fe, New Mexico. (NMED 2015, 600928)

NMED (New Mexico Environment Department), September 22, 2015. "Response to Notice of Intent to Discharge; Permit Not Required to Add Tracers to Ground Water at Technical Area (TA) 16, AI:856 (PRD20150013)," New Mexico Environment Department letter to G.E. Turner (DOE) and A. Dorries (LANL) from M. Hunter (NMED-GWQB), Santa Fe, New Mexico. (NMED 2015, 600924)

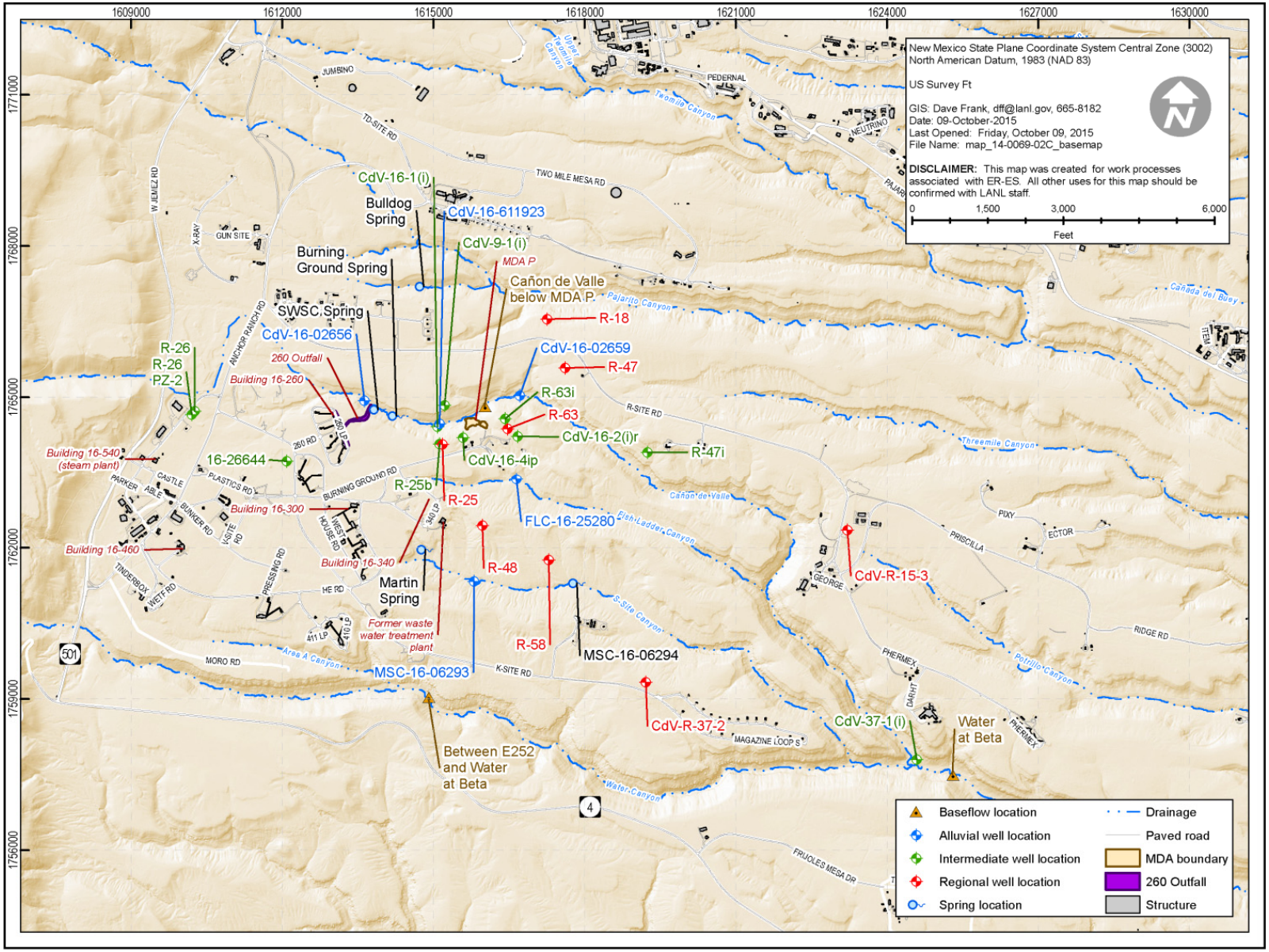

Figure 3.1-1 Monitoring wells, springs, and base-flow sampling locations in the vicinity of Consolidated Unit 16-021(c)-99 at TA-16